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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PATEL, SHEFALI D

ART UNIT PAPER NUMBER

2621

DATE MAILED: 01/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/538,398

Applicant(s)

SAWA ET AL.

Examiner

Shefali d Patel

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12 and 14-19 is/are rejected.
- 7) ☒ Claim(s) 6, 13 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because of the following informalities:
 - a. In Figure 5 label 6 "Design Pattern Memory Sij" ought to be changed to "Design Pattern Memory Rij" according to page 19, line 2 of the specification.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

- a. Figure 12 does not show "z stage 228" and element "233" as they are mentioned in specification on page 38 line 10, 23 and page 38 line 14, respectively.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because of the following informalities: On page 51 line 7, "Rig" ought to be changed to "Rij" according to the rest of the abstract and the specification. Correction is required. See MPEP § 608.01(b).

4. The disclosure is objected to because of the following informalities:
 - a. On page 2 line 16, "patter~~h~~" ought to be changed to "pattern"
 - b. On page 19 line 9, "form" should be "from."

- c. On page 23 line 4, “if” should be changed to “it”
- d. On page 23 line 6, “The, the...” should be “Then, the...”
- e. On page 26, line 9, “not” should be “no”.
- f. On page 28, line 26, “4” should be “131” according to Figure 9.
- g. On page 31, line 24, “a” should be “an”.
- h. On page 32, line 20, “4” should be “132” according to Figure 9.
- i. On page 35 line 6, please omit the word “or”
- j. On page 36 please define the meaning of the equations. $T(x,y)$ is not defined in the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4 and 8-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Bunn (USPN 4,641,350).

With regards to **claim 1** which is representative of **claim 8**, Bunn discloses a pattern inspection method and a device which acquires difference data by subtracting a real pattern window having real pattern data corresponding to predetermined pixels of the real pattern data obtained by imaging an inspection object from a design pattern window corresponding to the real

pattern window and shift design pattern windows which are obtained by shifting the design pattern windows in a plurality of directions. Bunn discloses a data of a reference image (X x Y) at column 6 lines 3-5 while the shift design pattern window (M x N) is at column 6 lines 27-29. By comparing (column 6 lines 34-44) these two arrays (i.e., windows) Bunn finds the difference data (column 8 lines 40-42). Bunn discloses selecting one window from the design pattern window and shift pattern windows such that the selected one window has a minimum difference data at column 7 lines 26-31. Bunn also discloses performing a pattern inspection of the inspection object based on a difference value between the selected one window and the real pattern window at column 7 lines 35-45. Note that the "M x N sub array is selected to be larger than the X x Y sub array in both dimensions to permit a search for a best match at many possible locations" (see Bunn: column 6, line 40-43). Thus the arrays are shifted relative to one another as required in the claims.

With regards to **claim 2** which is representative of **claim 9**, Bunn discloses a method and a device wherein the acquiring step, selecting step and performing step are repeatedly executed with respect to all pixels of the real pattern data as seen in Figures 4a-4d and also at column 6 line 48-51.

With regards to **claim 3** which is representative of **claim 10**, Bunn discloses a method and a device where the plurality of directions are eight directions of 0°, 45° (Figure 4b), 90°, 135° (Figure 4a), 180°, 225° (Figure 4c), 270°, 315° (Figure 4d) with respect to a noticed pixel of said real pattern window at column 7 lines 61-66. (Note that the windows 60, 62, 64, and 66 is being shifted respect to the dotted square which is the original (i.e., real) X x Y window). Keep

in mind that Bunn discloses all the eight direction. By shifting the windows 52, 54, 56 and 58 (as shown in Figs. 4a-4d) 0°, 90°, 180°, and 270° are covered.

With regards to **claim 4** which is representative of **claim 11**, Bunn discloses a performing step comprising selecting a central pixel of the selected one window (column 7 lines 51-55) obtaining a difference value between the selected central pixel and a central pixel of the window of said real pattern data (column 7 lines 55-61, note that by comparing two images and finding the difference between the two (error), Bunn finds the difference value) and determining a defect of the inspection object by comparing the obtained difference value between the selected central pixel of the selected one window and a threshold value set in advance (column 8 lines 28-34).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Scepanovic et al. (USPN 6,175,953) and Bunn.

With regards to **claim 15**, Scepanovic et al. discloses a substrate with a light shielding film on which a mask pattern is formed and inspecting a substrate with the light shielding film on which a mask pattern is formed at column 2 lines 18-31. Scepanovic et al. further teaches at column 10 lines 66-67 and column 11 lines 1-9 of relating his invention to machine-readable media and manufacturing. Thus disclosing the method of manufacturing a mask.

Scepanovic et al. does not expressly disclose the inspecting steps in claim 15 lines 23-27 of page 47 and lines 1-10 of page 48.

The recited features of the inspecting step (claim 15 lines 23-27 of page 47 and lines 1-10 of page 48) are the same as those in claim 1 as to the relevance of Bunn are incorporated herein.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to apply the image processing method (i.e., inspection) of Bunn in Scepanovic et al.'s invention for immunity of distortion and misregistration of images.

With regards to **claims 16-18**, the recited features are the same as those in claims 2-4, and the arguments in paragraph 6 above as to the relevance of Bunn are incorporated herein.

9. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunn in view of IBM technical disclosure bulletin number NN9106470 (Titled: "Improving Apparent Bandwidth of Refresh Displays"- refer to herein as IBM).

Regarding to **claim 5**, which is representative of **claim 12**, IBM discloses a shift width of the shifted design pattern windows within one pixel on pages 1, 2 and also clearly shown in Figure 3. IBM clearly shows at the bottom of page 1 that the frame is shifted within $\frac{1}{2}$ of the original grid. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use the concept of IBM (of shifting windows within one pixel) and combine with Bunn's to correlate the two templates in computing the difference between the two templates for inspection of a pattern. Shifting by less than a pixel increases the resolution to "improve picture quality" (see page 1 of IBM) for an accurate inspection.

10. Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunn in view of Masaki (USPN 4,547,800).

With regards to **claim 7**, which is representative of **claim 14**, Bunn discloses all the elements recited in claim 1. Bunn does not disclose determining the difference value based on lightness of pixels between the real and design pattern data. Masaki discloses a method and a device for position detection where the difference value is determined by correlating two images (i.e., real and design) at column 9 lines 9-20. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to find the difference value based on the lightness (or, darkness) of pixels since the illumination is necessary in inspecting a defect or a pattern.

11. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Bunn in view of Scepanovic et al. as applied to claim 15 above, and further in view of IBM technical disclosure bulletin number NN9106470. The arguments in paragraph 9 above as to the relevance of the IBM teachings are incorporated herein.

Allowable Subject Matter

12. Claims 6, 13, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 4345312 discloses Method and Device for inspecting the defect of a pattern represented on an article.

USPN 6040911 discloses reference image forming method and pattern inspection apparatus.

USPN 6087673 discloses method of inspecting pattern and apparatus thereof

USPN 4669123 discloses inspecting method and apparatus for photomask pattern

USPN 5185812 discloses optical pattern inspection system

USPN 4567610 discloses method of and apparatus for pattern recognition. See figures 2 and 3

USPN 4021778 discloses pattern recognition system

USPN 5581638 discloses method for autonomous image registration

USPN 5073952 discloses pattern recognition device, see figure 2

USPN 6005977 discloses method for position matching of images and system for testing products by using the same. See figures 3 and 4

USPN 4308523 discloses apparatus and method for character recognition.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shefali d Patel whose telephone number is 703-306-4182. The examiner can normally be reached on M-F; 8:00am - 5:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on 703-305-4706. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

Shefali Patel
December 30, 2002